Bilingualism: Interactions between languages

A majority of people in the world use more than one language in the course of their daily living, and it is estimated that most children today grow up with exposure to two or more languages. Although many people tend to think of a bilingual as an individual who has balanced and perfect command of the two languages he or she speaks, this conceptualization actually describes a very small minority of bilinguals. Most bilinguals differ in their proficiency of the two languages, and tend to use them in different contexts, for different purposes. Research over the last two decades has revealed that the two languages of bilinguals mostly rely on shared neural substrates and cognitive resources, giving rise to a rich and complex network of interactions and bidirectional influences between the two language systems.

A bilingual is not two monolinguals in one

One of the early and enduring questions in investigating bilinguals has been the degree to which the two language systems are independent, and whether bilinguals can in fact function as monolinguals under certain circumstances and in effect "turn off" one of the languages. The subjective feeling of many proficient bilinguals is that this is indeed the case, because most of the time such bilinguals manage to produce the intended language without experiencing interference or intrusions from the non-target language.

Francois Grosjean has investigated this issue and coined the term "language mode". On one end of the continuum lies **the monolingual language mode**, in which a bilingual effectively activates only one of the language systems, and processes language as a monolingual would. On the other end, is the full **bilingual mode** where both languages are active simultaneously, enabling such phenomena as code switching, in which a bilingual can alternate languages even within a single phrase.

Grosjean postulates that bilinguals have a choice in selecting the relevant language for a specific exchange based on their interlocutor, the topic, the context and other considerations. Grosjean also argues that bilinguals have a choice in determining how active the non-target language will be in such an exchange, again based inter alia on the linguistic knowledge of their conversant. This choice will then determine the bilingual's position along the language mode continuum in any given exchange. For example, a Spanish-English bilingual can choose to conduct a specific conversation in Spanish. However, if this conversation is conducted with another bilingual, the speaker may introduce various turns of speech in English, whereas if the conversational partner has no knowledge of English the speaker will limit the conversation to Spanish exclusively.

Other research, however, has brought into question the degree to which bilinguals can indeed deliberately deactivate one of their language systems, and operate in a true "monolingual mode". One of the reasons that this issue has been difficult to resolve is that in most experimental settings designed to investigate cross language influences, the bilingual mode has been instantiated to some degree, even if in a limited fashion. According to Grosjean, even the knowledge of participants in an experiment that they were recruited because of their bilingualism will move them along the continuum from a pure monolingual mode, and therefore increase the likelihood of finding evidence of some cross-language influences from the non-target language. Several examples of such influences will be described below.

Vivian Cook offers another informative perspective on bilingual language processing through his "multicompetence" framework. Cook claims that bilinguals are inherently different from monolingual speakers both of their first language (L1) and of the second language (L2). As such, monolinguals should not be the yardstick against which bilinguals are measured, because it is an impossible goal for L2 speakers to become monolingual native speakers of the language, and moreover a state that is unnecessary for most purposes for which individuals learn a second language. Cook argues that language education therefore should not strive to turn L2 learners into native speakers, but rather allow them to achieve their instrumental goal for learning the language, be it educational, occupational or cultural. The theoretical view of multicompetence and the fundamental differences between monolingual and bilingual language users is supported by various findings regarding the shared representations and interconnections between the languages of bilinguals.

<u>Shared or separate representations?</u>

As the description above would suggest, current models of the bilingual language system agree that there is at least some degree of sharing between the languages, although there is still much debate regarding exactly what levels of representation are shared. Because languages tend to refer to similar concepts, there is general agreement that conceptual and semantic representations of bilinguals are mostly shared across the two languages. Support for shared semantic representations, for example, comes from findings of robust translation priming in bilinguals. To illustrate, when a Spanish-English bilingual is briefly exposed to the English prime word *Table*, he is faster and more accurate to then respond to the Spanish target word *Mesa* (which shares the meaning of table). This finding is interpreted as demonstrating that the prime word activated the concept, and then facilitated processing of the target word. This account of shared conceptual representations leading to facilitation in word processing receives support from additional experimental paradigms.

Although less investigated, there is similar evidence in the domain of syntax and grammar. Thus, bilinguals who have just used a specific grammatical structure in one language, for example a passive construction, are more likely to produce a sentence in the other language using the same structure. This is a phenomenon called "syntactic priming", which was originally described for monolinguals in their native language. The fact that there is such priming between the languages of bilinguals is again taken as evidence supporting shared representations of syntactic information in the bilingual language system.

Cross language semantic and syntactic priming supports the notion of shared representations across languages, but alternative views have also been put forth. Specifically, most extant experimental evidence cannot rule out the possibility that separate representations exist for each language, but they are activated in parallel most of the time. Thus, when a bilingual speaker plans to speak a sentence, possible words and grammatical structures are activated in both languages, and ultimately the language of production is determined by control mechanisms, that inhibit activated representations in the non-target language. Similarly, when a bilingual encounters spoken or written linguistic input for comprehension, lexical candidates might become activated in both languages, and again competition is resolved by inhibitory processes, allowing the system to converge on the intended word in the relevant

language. Contrary to the subjective feeling of many proficient bilinguals, there is abundant empirical evidence that the bilingual language system is fundamentally non-selective for language, and that there is constant competition, both in comprehension and in production, between lexical items from the two languages. Thus, although it might still be difficult to distinguish at this point between simultaneous activation of parallel structures and representations and activation of single shared representations, the bottom line seems to be that both language systems continuously influence the performance of bilinguals.

Transfer and interference

In light of the description above, it is unsurprising that there is much evidence demonstrating a phenomenon called "transfer" in language learners and bilinguals. Transfer is defined as the influence from one language system to the other, and it can be positive or negative. Positive transfer is when a learner can rely on knowledge gained in the L1 to facilitate learning or processing of the L2. For example, a native English speaker learning Spanish might make use of the fact that the two languages are related and therefore share quite a few cognates, words that are similar in form and in meaning in the two languages. So knowing the meaning of the word *accident* in English makes it much easier to learn that the word *accidente* in Spanish means the same thing. Positive transfer can operate at different linguistic levels – phonology, morphology, lexicon and grammar.

Negative transfer is when knowledge from the L1 actually inhibits learning or correctly processing the L2. At the level of phonology, this manifests as accented speech, or difficulty in perceiving novel phonological distinction in the L2. At the lexical level, negative transfer might occur in the case of false cognates, also known as interlingual homographs. Thus, knowing that the word *pan* in English means a cooking utensil, might actually make it more difficult for learners to learn that *pan* in Spanish means bread. Negative transfer is also called "interference". In the following three sections effects of transfer or interference are described in more detail for phonology, lexicon and grammar.

Phonological perception and production

One domain in which children and adult bilinguals show cross-language influences is their ability to perceive and produce the sounds of their two languages.

Infants acquiring two languages most likely develop separate representations for the sounds of the two languages, but this process is influenced by the age of initial acquisition and also by the amount of exposure to each language. For learners exposed to an L2 later in life, there are significant influences from the L1. Learners often find it difficult to precisely perceive novel sound distinctions that do not exist in their native language. Similarly, L2 learners are not always able to produce the sounds of the language in the same manner that native speakers do, which leads to accented speech. In language production, there are two types of situations that lead to divergence in pronunciation. The first is when the L2 contains a sound that the L1 does not. For example, native speakers of Hebrew learning English often have difficulty producing the "th" sound, because it does not exist in their native language. In such cases, the new sound is often pronounced as a sound that the speaker is familiar with, in this case as /d/ or /t/ for the voiced "the" and /f/ or /s/ for the unvoiced variation. The second situation is when there are novel phonological distinctions in the L2. The best-known example for this is the difficulty of native Japanese speakers to produce "l" and "r" sounds in English, because Japanese has only a single sound covering this range.

Lexicon

Bilinguals and second language learners occasionally make word choices that diverge from those of monolingual native speakers, due to influences from the other language that they know. Cross language influence might also shape the perceptions of bilinguals regarding relations among words in the language. To illustrate, a study investigating Hebrew-English bilinguals found that word pairs in English that shared a single translation in Hebrew (e.g. *objection* and *resistance* are both translated as *hitnagdut*) were rated as more similar in meaning by bilinguals than by monolingual English speakers. Interestingly, the magnitude of this effect was the same for native Hebrew speakers who had learned English as an L2 (demonstrating influence from the L1 to the L2) and for native English speakers, who had immigrated to Israel and learned Hebrew later in life (demonstrating influence from the L2 on the L1). Similar effects have also been demonstrated for Chinese-English bilinguals, whose brain potentials revealed links between English words whose translations share a character in Chinese.

Syntax and morphology

   Cross language influences have also been described in the domain of grammar and syntax. Many languages assign grammatical gender to inanimate nouns, a domain which has proved notoriously difficult for second language learners to master to high degrees of accuracy. For example, nouns in German can be assigned one of three genders (feminine, masculine or neuter) and nouns in Dutch can be assigned one of two genders (common or neuter). Many nouns are compatible in their gender assignment across the two languages, which could facilitate learning due to positive transfer. However, some nouns are incompatible, in that they are assigned one gender in German but a different gender in Dutch. For example the German word for bike (*fahrrad*) is neuter, but the Dutch word for bike (*fiets*) is common, resulting in a mismatch. A study reported by Kristin Lemhöfer and colleagues investigated native speakers of German learning Dutch as a second language and found that indeed they made many errors in gender assignment of such words in Dutch, showing a strong influence from the gender of the word in their native language, German. This tendency was especially strong when the words in the two languages were cognates, such as *auto* (which means car in German and in Dutch, but is of neuter gender in the former and common gender in the latter). Encouragingly, when participants within this study were given corrective feedback significant learning occurred, and they were able to increase their accuracy in assigning the correct gender in Dutch, their L2, and to overcome the interference from German, their L1. Alas, none of the learners achieved perfect performance following feedback, and many continued to exhibit rather high error rates, attesting to the powerful influence of L1 in learning a difficult new morpho-syntactic mapping in the L2.

   Interestingly syntactic influences in the opposite direction, namely from L2 to L1, have also been reported, for example in a study by Paola Dussias examining the syntactic preferences of bilingual speakers of Spanish and English. The study capitalized on the fact that native speakers of Spanish and English differ in the way they process sentences of the type *An armed robber shot the sister of the actor who was on the balcony*, where the relative clause "who was on the balcony" is temporarily ambiguous because it can describe either the actor or his sister. English monolinguals normally adopt the first interpretation, understanding that the actor was on the balcony, whereas when Spanish speaking monolinguals read a Spanish translation of such a sentence they are most likely to conclude that it was the sister

who was on the balcony. In an experiment the performance of monolinguals and bilinguals was monitored while they read sentences including temporarily ambiguous relative clauses in Spanish. The results showed that monolingual Spanish speakers showed the expected bias, as did highly proficient Spanish-English bilinguals, who had only a limited experience of immersion in an English speaking environment. Crucially, a second group of Spanish-English who were matched in proficiency to the first bilingual group, but had spent extensive periods immersed in an English speaking environment showed the opposite pattern, which usually characterizes monolinguals reading in English, even though they were processing sentences in Spanish, their native and dominant L1. These findings are interpreted as reflecting influence from the syntactic preferences of an extensively used L2 on the processing of L1 sentences, and again attest to the multilevel interactions between the languages of bilinguals.

Conclusion

The evidence presented above leads to the inevitable conclusion that the languages of bilinguals are indelibly intertwined with each other. Therefore, an increasingly central undertaking in the research of bilingual language processing and second language learning is to achieve a better and more detailed understanding of the particulars of these cross-language interactions. Further complicating this endeavor is that specific form of such interactions is most likely influenced by a multitude of factors including age of acquisition of each language, the relative proficiency of the speaker, how much and in what manner each language is used, and the phonological, structural and typological structure of the languages. Although much is still unknown, several themes emerge as deserving of future research.

First, a main tension that has to be explained in order to understand language processing in bilinguals is how the system responds to the pressures of parsimony to avoid redundant representations, while at the same times allowing bilinguals the functional flexibility to either communicate in only one language or to mix and switch languages at will.

Second, although transfer, interference and cross-language influence seem ubiquitous across many levels of representation and processing, the current state of knowledge mostly does not allow us to distinguish between two routes in which such influences could be realized. The first might be termed structural-representational influence, which would be expressed in the divergence of the linguistic "knowledge"

of a bilingual speaker in either or both languages from that of monolingual speakers of the language. The second route calls on more dynamic online influences, that are the result of activation of the two language systems in real time as processing is unfolding, thus resulting in influences from one system to the other. These possibilities are difficult to tease apart, are not mutually exclusive, and most likely operate in concert. However, a full understanding of bilingual language representation should have the goal of developing experimental methods that would enable a more detailed description of these two routes.

Finally, one of the hallmarks of increasing bilingual proficiency is the ability to overcome interference from the non-relevant language, a finding that has been linked to cognitive control abilities more generally. In this domain as well more research is still necessary to understand whether the language system itself undergoes restructuring and tuning to allow better cross-language interactions, or whether a component of increasing proficiency includes recruiting other cognitive and brain systems for managing the interference arising within the language system.

Bilingualism is increasingly prevalent in the modern world, and bilinguals are fundamentally different from monolinguals. The complex interactions between the two language systems of bilinguals are one of the central causes of this difference, and as such will most likely continue to receive much attention from researchers, practitioners and educators.

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See also: Age of acquisition effects in language development; Bilingual language development; Bilingualism: effects on cognitive development; Competition model of language development and processing; First language attrition and loss in bilinguals

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